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24 November 1964

MEMORANDUM FOR:

[REDACTED]
P & DS, NPIC

Development Branch,

SUBJECT:

Suggestions for Second Phase of
[REDACTED] Study: PI Performance
as a Function of Stereo Convergence
Angle

The following suggestions are made in connection with the study to determine optimum stereo convergence angle for photo interpreters:

1. The study should simulate a satellite photographic system having the following characteristics:

- a. Altitude of photography - [REDACTED] miles
- b. Focal length of camera - 60 inches
- c. Ground resolution - [REDACTED] (2:1 contrast)

2. Since the time limit on the study will not allow a large photographing and testing program, the sun elevation and azimuth angles should remain relatively fixed in the test. Sun elevation angle should be sufficient to obtain shadows but at the same time should not create large shadow "dead" areas. (A sun elevation angle in the range of 60° to 80° would appear to be satisfactory)

DDR-Dupe

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3. Since it is not known if obliquity angle has an effect on optimum stereo convergence angle, it is suggested that the study include at least two obliquity angles. Obliquity angles close to 15° and 35° would appear reasonable-- 15° being within the range recognized by PIs as desirable obliquity for stereo study of targets, and 35° being beyond the present G system's normal stereo coverage but within the range feasible for future systems.

4. The range of full stereo angles to be covered in the study should be determined as suggested in the meeting held at NPIC on 20 November 1964. The upper limit of useable stereo from a PI point of view was believed to have been determined and to be physiologically limited to some angle close to 30° . This limit should be determined by a study of the available literature. From a mensuration point of view there was believed to exist a lower limit beyond which accuracy of measurement falls off rapidly. NPIC representatives agreed to ask consultant to NPIC, to determine this limit(s) for obliquity angles out to somewhere between 30° and 60° . It is suggested that four angles equally divided between the above lower and upper limits be considered in this study to determine PI optimum stereo convergence angles.

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5. In view of the limited time available in which to conduct the study, target type will have to be restricted. The following suggestions are made for inclusion in the list of target types from which selection will be made:

Missile production facilities--possibly including test stands

Missile complexes under construction

Nuclear plants/complexes

Shipyards/ship repair yards

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6. Photography could begin prior to determination of upper and lower limits on stereo angles if the scheme suggested by [REDACTED] of OSA (indexing camera angle to aircraft ground speed) is used. Photography covering stereo angles out to about 36° could be obtained and the final selection of frames be made later after upper and lower limits for the study are determined. Photography taken at aircraft altitudes will not simulate the h/h factor of satellite photography, however, and it is not known how much, if any, this factor would affect results. It is therefore recommended that some thought be given to the possibility of using present [REDACTED] coverage of U.S. installations if sufficient coverage exists to allow stereo pairing of frames at a few different convergence angles for more than one obliquity. We do not know how much such coverage exists and if it does exist, its quality. If sufficient good quality U.S. coverage by the [REDACTED] camera does not exist, aircraft coverage should start as soon as possible and the question material adapted to try to compensate for any h/h factor effect.

[REDACTED]
DDS&T, SPS

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